

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER
112740-518

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

10/049397

INTERNATIONAL APPLICATION NO.
PCT/DE00/02331

INTERNATIONAL FILING DATE
18 July 2000

PRIORITY DATE CLAIMED
12 August 1999

TITLE OF INVENTION

**METHOD FOR MONITORING THE POSITION OF A MOBILE COMMUNICATION TERMINAL FOR
LOCATION DEPENDENT TELECOMMUNICATION SERVICES AND AN ACTIVE VOICE CONNECTION**

APPLICANT(S) FOR DO/EO/US

Alexander Aschir et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☒ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☒ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☒ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☒ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail
23. ☐ Other items or information:

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.53) 10/049397		INTERNATIONAL APPLICATION NO. PCT/DE00/02331		ATTORNEY'S DOCKET NUMBER 112740-518	
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24. The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) : <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1040.00 <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00				CALCULATIONS PTO USE ONLY	
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$890.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input type="checkbox"/> 30				\$0.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	9 - 20 =	0	x \$18.00	\$0.00	
Independent claims	1 - 3 =	0	x \$84.00	\$0.00	
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>				\$0.00	
TOTAL OF ABOVE CALCULATIONS =				\$890.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$0.00	
SUBTOTAL =				\$890.00	
Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)). <input type="checkbox"/> 20 <input type="checkbox"/> 30 +				\$0.00	
TOTAL NATIONAL FEE =				\$890.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>				\$0.00	
TOTAL FEES ENCLOSED =				\$890.00	
				Amount to be: refunded	\$
				charged	\$

a. ☒ A check in the amount of **\$890.00** to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **02-1818** A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

William E. Vaughan (Reg. No. 39,056)
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SIGNATURE
William E. Vaughan
 NAME
39,056
 REGISTRATION NUMBER
February 11, 2002
 DATE

BOX PCT

IN THE UNITED STATES ELECTED/DESIGNATED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY-CHAPTER II

5

PRELIMINARY AMENDMENT

APPLICANTS: Alexander Aschir et al. DOCKET NO.: 112740-518
SERIAL NO: GROUP ART UNIT:
FILED: EXAMINER:
INTERNATIONAL APPLICATION NO:: PCT/DE00/02331
INTERNATIONAL FILING DATE 18 July 2000
INVENTION: METHOD FOR MONITORING THE POSITION OF A
MOBILE COMMUNICATION TERMINAL FOR
LOCATION DEPENDENT TELECOMMUNICATION
SERVICES AND AN ACTIVE VOICE CONNECTION

Assistant Commissioner for Patents,
Washington, D.C. 20231

10

Sir:

Please amend the above-identified International Application before entry
into the National stage before the U.S. Patent and Trademark Office under 35
U.S.C. §371 as follows:

15

In the Specification:

Please replace the Specification of the present application, including the
Abstract, with the following Substitute Specification:

SPECIFICATION

TITLE OF THE INVENTION

20

METHOD FOR MONITORING THE POSITION OF A MOBILE
COMMUNICATION TERMINAL FOR LOCATION DEPENDENT
TELECOMMUNICATION SERVICES AND AN ACTIVE VOICE
CONNECTION

BACKGROUND OF THE INVENTION

Location dependent telecommunication services (*Location Dependent Services*) are becoming more and more significant in mobile radio networks.

5 A known technology for implementing such and other telecommunication services in telecommunication networks, in particular in the mobile radio network, is the "Intelligent Network" IN, which is known to the person skilled in the art through ITU publications (Q.1200 ff) and ETSI standards.

For calls originating from a mobile terminal (Mobile Originating Call, MOC), only the location of the mobile terminal (Mobile Station, MS) when the
10 connection is set up is currently assessed.

In this context, the location of the terminal can, up until now, be established in the manner below. The message IDP (INAP Operation Initial DP) to the service center contains a location information item (*LocationInformation*) which contains the number (*LocationNumber*) of that radio cell (*serving cell*) in a mobile radio
15 network which is originally used to set up the call. If the service customer moves into another cell (handover), the service center (for example, the SCP, Service Control Point) is given no kind of indication about the change of location.

The consequence for a service and, by way of example, its specific billing (Home Zone Billing, HZB), depending on the location, is as follows: if the service
20 customer starts a telephone call within a privileged radio cell (Home Zone), the call is billed at a cheaper rate. This situation also does not change if he/she leaves this radio cell (Home Zone), however. The service provider wants the service customer to telephone at a cheaper rate only within his/her own radio cell(s) (Home Zone), but at the normal mobile radio tariffs outside this (these) radio cell(s).

25 The same applies for the opposite direction: if the service customer starts a telephone call outside his/her Home Zone and enters his/her Home Zone during the call, then his/her telephone call is billed at the higher rate in his/her Home Zone too.

The same problem also arises when the customer using the location dependent service, which uses this billing model, for example, is called (Mobile
30 Terminating Call, MTC).

This concerns all the position-dependent characteristics of a telecommunication service; for example, including access authorizations to particular services, restrictions on service characteristics in particular radio cells, etc.

5 Techniques for position finding are already known. Delay time measurements can be used to establish the location of the mobile terminal with an accuracy of approximately 100 meters (*Time Of Arrival TOA, Enhanced Observed Time Difference E-OTD*). The use of a radio-assisted global positioning system (GPS) is also known.

10 Both solutions are complex and cost intensive. They also provide much more accurate position details than are needed for the telecommunication services described.

It is an object of the present invention to specify a method which permits sufficiently accurate position finding for a mobile terminal during a call and, at the same time, avoids the drawbacks cited above.

15

SUMMARY OF THE INVENTION

A key feature of the present invention is that the telecommunication service, which can be activated by the A-party (that is to say, by the calling party, MOC) or by the B-party (that is to say, by the called party, MTC), is location dependent. As such, it may be subject to different billing models, or else that other service features (Features) may differ depending on location.

20

To guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also over the entire duration of the active connection. If a change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center; that is to say, a change to the billing model used, for example.

25

Once the telecommunication service becomes aware of the changes of position, the service center (for example, the SCP in an IN) can then react to the change during the call, a service characteristic which has not been available to date.

30

An advantage over "Time Of Arrival" (TOA) and "Enhanced Observed Time Difference" (E-OTD) is that the technology available in the network is used. The solution presented in this case is simpler to implement, even if it is not as accurate.

- 5 The inventive method is particularly advantageous when a special billing model is used in which the charges incurred are dependent on which subscriber is involved and what his current position is.

The change of position can, in principle, be initiated:

- via the terminal:
10 In one preferred embodiment, the terminal reports its position to the service center. This can be done whenever the terminal establishes a (significant) change of position or else at regular intervals and also a combination of the two.
- via the service center:
15 In another embodiment, the position of the terminal is requested by the service center. This can be done at regular intervals.

In this context, the position information item transmitted from the communication terminal to the service center may be in any format. If it is not in
20 the format used by the service center, the service center needs to convert it into suitable position information after reception.

The regularity and the intervals with/at which position information is transmitted can be chosen as appropriate by the person skilled in the relevant art.

Additional features and advantages of the present invention are described in,
25 and will be apparent from, the following Detailed Description of the Invention and the Figures.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a schematic illustration of a mobile radio network of cellular design and a terminal whose position within the mobile radio network changes
30 during a call.

Figure 2 shows a solution variant initiated by the SCP.

Figure 3 shows a solution variant initiated by the terminal.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a mobile radio network of cellular design containing a few
5 radio cells FZ1, FZ2, FZ3 and FZ4. Each radio cell contains apparatuses H-BSC,
V-BSC, illustrated by triangles, which control the radio traffic for the cell in
question. These apparatuses are connected to a central controller MSC which has
access to subscriber registers HLR and VLR. These techniques are known to the
person skilled in the art of GSM (Global System for Mobile Communication)
10 technology, but other cellular radio networks such as PCN (Personal
Communication Network) or the like are also conceivable.

A subscriber in this mobile radio network now uses his/her terminal MT
(Mobile Terminal) to dial another subscriber number and, thus, obtains a
connection to the network in his/her radio cell FZ1. The location of the second
15 subscriber B-Party and his/her exchange M-SSP are not relevant to the inventive
method.

This radio cell is linked to a particular characteristic in the service center.
This may be a particular billing system referred to by the operator as the Home
Zone, and this connection is thus billed using a separate billing model.
20

If the subscriber now moves, leaves the Home Zone and enters the
neighboring radio cell FZ3, the central controller is informed about this change of
position, as shown in Figures 2 and 3.

The position is transmitted to the service center during the telephone call via
additional *Unstructured Supplementary Service Data* USSD and SIM toolkit, for
25 example. In this context, location information available in MT and/or location
changes are transmitted. Parameters which are available are, by way of example,
"Location Area Identity" (LAI), "Serving Cell ID" and "Serving Cell Channel".

Two solution variants can be envisaged:

- SCP initiates: Figure 2. The IN service logic in the service control
30 center SCP asks at service-specific time intervals whether the

telephoning subscriber A-Party has moved (- this allows the service provider to keep the signaling load under control). To this end, the SCP sends the IN customer a request USSD Request (to the Calling Party Address CgPA in the case of MOC services, to the Called Party Address CdPA in the case of MTC services) which tells the SIM toolkit of the MS to respond with a USSD Response containing location information and/or location changes.

- MS initiates: Figure 3. In the event of handover, the MT uses the SIM toolkit to inform the service center SCP via USSD Request that it has moved. Even within an enclosed space, handover frequently occurs if an adjacent cell has a better signal strength. In this case, however, there has been no change of location relevant to the service provider. To prevent the SCP from being notified of an unnecessary amount of location changes as a result of this, a time controller also can be incorporated in the MT: the MS divulges the location information and/or location changes no earlier than after a settable time period, but immediately once this time period has elapsed.

Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

ABSTRACT OF THE DISCLOSURE

A method for monitoring the position of a mobile communication terminal for location dependent telecommunication services and an active voice connection, wherein to guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also for the entire time of the connection, such that if a change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center.

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In the Claims:

On page 8, cancel line 1 and substitute the following left hand justified heading therefor:

5 CLAIMS

Please cancel claims 1-8, without prejudice, and substitute the following claims therefor.

9. A method for monitoring a position of a mobile communication
10 terminal for location dependent telecommunication services and an active voice connection, the method comprising the steps of:

obtaining, via a service control center in the mobile radio network, a
first information item relating to the position of the mobile communication terminal
within the mobile radio network from the mobile communication terminal when a
15 connection for a call is set up;

using the first position information item by selected location
dependent telecommunication services;

checking again the position of the mobile communication terminal
during the call;

20 using, by the service control center, a change of position established during the call which has been set up to obtain a second position information item from the mobile communication terminal; and

using the second position information item by the
telecommunication services.

25

10. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the steps of:

making billing for a telecommunication service dependent on the position information item for the mobile communication terminal to be billed; and

5 adjusting the billing for the telecommunication service if a change in the position of the terminal is established.

11. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of:

10 requesting the position information item for the mobile communication terminal from the mobile communication terminal by the service control center.

12. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of requesting a position information item at regular intervals.

13. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of reporting a position information item at regular intervals.

14. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of reporting the position after a change of position.

15. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of ascertaining location information available in the mobile communication terminal by an SIM tool kit available at the mobile communication terminal.

16. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of transmitting a position information item by Unstructured Supplementary Service Data.

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17. A method for monitoring a position of a mobile communication terminal as claimed in claim 9, the method further comprising the step of transmitting a position information item by Short Message Service.

REMARKS

10 The present amendment makes editorial changes and corrects typographical errors in the specification, which includes the Abstract, in order to conform the specification to the requirements of United States Patent Practice. No new matter is added thereby.

15 Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Versions with Markings to Show Changes Made."**

20 In addition, the present amendment cancels original claims 1-8 in favor of new claims 9-17. Claims 9-17 have been presented solely because the revisions by crossing out underlining which would have been necessary in claims 1-8 in order to present those claims in accordance with preferred United States Patent Practice would have been too extensive, and thus would have been too burdensome. The present amendment is intended for clarification purposes only and not for substantial reasons related to patentability pursuant to 35 U.S.C. §§101, 102, 103 or 112. Indeed, the cancellation of claims 1-8 does not constitute an intent on the part of the Applicants to surrender any of the subject matter of claims 1-8.

25

Early consideration on the merits is respectfully requested.

Respectfully submitted,

BELL, BOYD & LLOYD LLC

BY



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Chicago, Illinois 60690-1135

Phone: (312) 807-4282

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Description

SPECIFICATION

- 5 Method for monitoring the position of a mobile communication terminal for
location dependent telecommunication services and an active voice connection

TITLE OF THE INVENTION

"METHOD FOR MONITORING

THE POSITION OF A MOBILE COMMUNICATION

- 10 TERMINAL FOR LOCATION DEPENDENT TELECOMMUNICATION
SERVICES AND AN ACTIVE VOICE CONNECTION"

BACKGROUND OF THE INVENTION

Technical field of the invention

- 15 Location dependent telecommunication services (*Location Dependent*
Services) are becoming more and more significant in mobile radio networks.

A known technology for implementing such and other telecommunication services in telecommunication networks, in particular in the mobile radio network, is the "Intelligent Network" IN, which is known to the person skilled in the art through ITU publications (Q.1200 ff) and ETSI standards.

- 20 For calls originating from a mobile terminal (Mobile Originating Call, MOC), only the location of the mobile terminal (Mobile Station, MS) when the connection is set up is currently assessed.

- 25 In this context, the location of the terminal can, up to until now, be established in the manner below. The message IDP (INAP Operation Initial DP) to the service center contains a location information item (*LocationInformation*) which contains the number (*LocationNumber*) of that radio cell (*serving cell*) in a mobile radio network which is originally used to set up the call. If the service customer moves into another cell (handover), the service center (for example, the SCP, Service Control Point) is given no kind of indication about the change of location.

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The consequence for a service and, by way of example, its specific billing (Home Zone Billing, HZB), depending on the location, is as follows: if the service customer starts a telephone call within a privileged radio cell (Home Zone), the call is billed at a cheaper rate. This situation also does not change if he/she leaves this radio cell (Home Zone), however. The service provider wants the service customer to telephone at a cheaper rate only within he/she own radio cell(s) (Home Zone), but at the normal mobile radio tariffs outside this (these) radio cell(s).

The same applies for the opposite direction: if the service customer starts a telephone call outside his/her Home Zone and enters his/her Home Zone during the call, then his/her telephone call is billed at the higher rate in his/her Home Zone too.

The same problem also arises when the customer using the location dependent service, which uses this billing model, for example, is called (Mobile Terminating Call, MTC).

This concerns all the position-dependent characteristics of a telecommunication service; for example, including access authorizations to particular services, restrictions on service characteristics in particular radio cells, etc.

Prior art

Techniques for position finding are already known. Delay time measurements can be used to establish the location of the mobile terminal with an accuracy of approximately 100 meters (*Time Of Arrival TOA, Enhanced Observed Time Difference E-OTD*). The use of a radio-assisted global positioning system (GPS) is also known.

Both solutions are complex and cost intensive. They also provide much more accurate position details than are needed for the telecommunication services described.

It is an object of the present invention to specify a method which permits sufficiently accurate position finding for a mobile terminal during a call and, at the same time, avoids the drawbacks cited above.

Description of the invention

This object is achieved by a method in accordance with patent claim 1.
~~In this context, an extension is described below for telecommunication services (MOC and MTC).~~

SUMMARY OF THE INVENTION

5 The A key feature fundamental to of the present invention is that the telecommunication service, which can be activated by the A-party (that is to say, by the calling party, MOC) or by the B-party (that is to say, by the called party, MTC), is location dependent. ~~This may mean that it is~~ As such, it may be subject to
10 different billing models, or else that other service features (Features) may differ depending on location.

 To guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also over the entire duration of the active connection. If a
15 change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center; that is to say, a change to the billing model used, for example.

 Once the telecommunication service becomes aware of the changes of position, the service center (for example, the SCP in an IN) can then react to the
20 change during the call, a service characteristic which has not been available to date.

 The An advantage over "Time Of Arrival" (TOA) and "Enhanced Observed Time Difference" (E-OTD) is that the technology available in the network is used. The solution presented in this case is simpler to implement, even if it is not as
25 accurate.

~~Advantageous refinements and developments are specified in the subclaims.~~

 The inventive method is particularly advantageous when a special billing model is used in which the charges incurred are dependent on which subscriber is involved and what his current position is.

30 The change of position can, in principle, be initiated:

- via the terminal:

In one preferred embodiment, the terminal reports its position to the service center. This can be done whenever the terminal establishes a (significant) change of position or else at regular intervals and also a combination of the two.

- via the service center:

In another embodiment, the position of the terminal is requested by the service center. This can be done at regular intervals.

10 In this context, the position information item transmitted from the communication terminal to the service center may be in any format. If it is not in the format used by the service center, the service center needs to convert it into suitable position information after reception.

15 The regularity and the intervals with/at which position information is transmitted can be chosen as appropriate by the person skilled in the relevant art.

Additional features and advantages of the present invention are described in, and will be apparent from, the following Detailed Description of the Invention and the Figures.

Brief description of the drawings

20 **BRIEF DESCRIPTION OF THE FIGURES**

The invention is explained below using exemplary embodiments, where

Figure 1 shows a schematic illustration of a mobile radio network of cellular design and a terminal whose position within the mobile radio network changes during a call.

25 Figure 2 shows a solution variant initiated by the SCP, and

Figure 3 shows a solution variant initiated by the terminal.

Description of the preferred embodiments

DETAILED DESCRIPTION OF THE INVENTION

30 Figure 1 shows a mobile radio network of cellular design containing a few radio cells FZ1, FZ2, FZ3 and FZ4. Each radio cell contains apparatuses H-BSC,

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V-BSC, illustrated by triangles, which control the radio traffic for the cell in question. These apparatuses are connected to a central controller MSC which has access to subscriber registers HLR and VLR. These techniques are known to the person skilled in the art of GSM (Global System for Mobile Communication) technology, but other cellular radio networks such as PCN (Personal Communication Network) or the like are also conceivable.

A subscriber in this mobile radio network now uses his/her terminal MT (Mobile Terminal) to dial another subscriber number and, thus, obtains a connection to the network in his/her radio cell FZ1. The location of the second subscriber B-Party and his/her exchange M-SSP are not relevant to the inventive method.

This radio cell is linked to a particular characteristic in the service center. This may be a particular billing system referred to by the operator as the Home Zone, and this connection is thus billed using a separate billing model.

If the subscriber now moves, leaves the Home Zone and enters the neighboring radio cell FZ3, the central controller is informed about this change of position, as shown in the two subsequent figures Figures 2 and 3.

The position is transmitted to the service center during the telephone call by means of via additional *Unstructured Supplementary Service Data* USSD and SIM toolkit, for example. In this context, location information available in MT and/or location changes are transmitted. Parameters which are available are, by way of example, "Location Area Identity" (LAI), "Serving Cell ID" and "Serving Cell Channel".

Two solution variants can be envisaged:

- SCP initiates: Figure 2. The IN service logic in the service control center SCP asks at service-specific time intervals whether the telephoning subscriber A-Party has moved (- this allows the service provider to keep the signaling load under control). To this end, the SCP sends the IN customer a request USSD Request (to the Calling Party Address CgPA in the case of MOC services, to the Called Party Address

CdPA in the case of MTC services) which tells the SIM toolkit of the MS to respond with a USSD Response containing location information and/or location changes.

- 5 • MS initiates: Figure 3. In the event of handover, the MT uses the SIM toolkit to inform the service center SCP via USSD Request that it has moved. Even within an enclosed space, handover frequently occurs if an adjacent cell has a better signal strength; ~~in~~, In this case, however, there has been no change of location relevant to the service provider. To prevent the SCP from being notified of an unnecessary amount of location changes as a result of this, a time controller ~~can~~ also can be incorporated in the MT: the MS divulges the location information and/or location changes no earlier than after a settable time period, but immediately once this time period has elapsed.
- 10
- 15 Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

Abstract

ABSTRACT OF THE DISCLOSURE

5 A Method for monitoring the position of a mobile communication terminal for location dependent telecommunication services and an active voice connection, wherein to To guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also for the entire time of the connection. If, such that if a change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center.

10

Figure 1

3/17/83

GR 99 P 2540

- 1 -

Description

Method for monitoring the position of a mobile communication terminal for location dependent
5 telecommunication services and an active voice connection

Technical field of the invention

10 Location dependent telecommunication services (*Location Dependent Services*) are becoming more and more significant in mobile radio networks.

A known technology for implementing such and other telecommunication services in telecommunication
15 networks, in particular in the mobile radio network, is the "Intelligent Network" IN, which is known to the person skilled in the art through ITU publications (Q.1200 ff) and ETSI standards.

20 For calls originating from a mobile terminal (Mobile Originating Call, MOC), only the location of the mobile terminal (Mobile Station, MS) when the connection is set up is currently assessed.

In this context, the location of the terminal can up to
25 now be established in the manner below. The message IDP (INAP Operation Initial DP) to the service center contains a location information item (*LocationInformation*) which contains the number (*LocationNumber*) of that radio cell (*serving cell*) in a
30 mobile radio network which is originally used to set up the call. If the service customer moves into another cell (handover), the service center (for example the SCP, Service Control Point) is given no kind of indication about the change of location.

35 The consequence for a service and, by way of example, its specific billing (Home Zone Billing, HZB), depending on the location, is as follows: if the

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service customer starts a telephone call within a
privileged radio cell (Home Zone), the

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call is billed at a cheaper rate. This situation also does not change if he leaves this radio cell (Home Zone), however. The service provider wants the service customer to telephone at a cheaper rate only within his
5 own radio cell(s) (Home Zone), but at the normal mobile radio tariffs outside this (these) radio cell(s).

The same applies for the opposite direction: if the service customer starts a telephone call outside his
10 Home Zone and enters his Home Zone during the call, then his telephone call is billed at the higher rate in his Home Zone too.

The same problem also arises when the customer using
15 the location dependent service, which uses this billing model, for example, is called (Mobile Terminating Call, MTC).

This concerns all the position-dependent
20 characteristics of a telecommunication service, for example including access authorizations to particular services, restrictions on service characteristics in particular radio cells, etc.

25 **Prior art**

Techniques for position finding are already known. Delay time measurements can be used to establish the location of the mobile terminal with an accuracy of
30 approximately 100 meters (*Time Of Arrival TOA, Enhanced Observed Time Difference E-OTD*). The use of a radio-assisted global positioning system (GPS) is also known.

Both solutions are complex and cost intensive. They
35 also provide much more accurate position details than are needed for the telecommunication services described.

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It is an object of the invention to specify a method which permits sufficiently accurate position finding for a mobile terminal during a call and at the same time avoids the drawbacks cited above.

5

Description of the invention

This object is achieved by a method in accordance with patent claim 1.

10

In this context, an extension is described below for telecommunication services (MOC and MTC).

The feature fundamental to the invention is that the telecommunication service, which can be activated by the A-party (that is to say by the calling party, MOC) or by the B-party (that is to say by the called party, MTC), is location dependent. This may mean that it is subject to different billing models, or else that other service features (Features) differ depending on location.

To guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also over the entire duration of the active connection. If a change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center, that is to say a change to the billing model used, for example.

Once the telecommunication service becomes aware of the changes of position, the service center (for example the SCP in an IN) can then react to the change during the call - a service characteristic which has not been available to date.

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The advantage over "Time Of Arrival" (TOA) and "Enhanced Observed Time Difference" (E-OTD) is that the technology available in the network is used. The solution presented in this case is simpler to
5 implement, even if it is not as accurate.

Advantageous refinements and developments are specified in the subclaims.

10 The inventive method is particularly advantageous when a special billing model is used in which the charges incurred are dependent on which subscriber is involved and what his current position is.

15 The change of position can, in principle, be initiated:
- via the terminal:

In one preferred embodiment, the terminal reports its position to the service center. This can be done whenever the terminal establishes a (significant)
20 change of position or else at regular intervals and also a combination of the two.

- via the service center:
In another embodiment, the position of the terminal is requested by the service center. This can be done
25 at regular intervals.

In this context, the position information item transmitted from the communication terminal to the service center may be in any format. If it is not in
30 the format used by the service center, the service center needs to convert it into suitable position information after reception.

The regularity and the intervals with/at which position
35 information is transmitted can be chosen as appropriate by the person skilled in the relevant art.

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Brief description of the drawings

The invention is explained below using exemplary embodiments, where

- 5 figure 1 shows a schematic illustration of a mobile radio network of cellular design and a terminal whose position within the mobile radio network changes during a call,
- figure 2 shows a solution variant initiated by the SCP, and
- 10 figure 3 shows a solution variant initiated by the terminal.

Description of the preferred embodiments

- 15 Figure 1 shows a mobile radio network of cellular design containing a few radio cells FZ1, FZ2, FZ3 and FZ4. Each radio cell contains apparatuses H-BSC, V-BSC, illustrated by triangles, which control the radio
- 20 traffic for the cell in question. These apparatuses are connected to a central controller MSC which has access to subscriber registers HLR and VLR. These techniques are known to the person skilled in the art of GSM (Global System for Mobile Communication) technology,
- 25 but other cellular radio networks such as PCN (Personal Communication Network) or the like are also conceivable.

- A subscriber in this mobile radio network now uses his
- 30 terminal MT (Mobile Terminal) to dial another subscriber number and thus obtains a connection to the network in his radio cell FZ1. The location of the second subscriber B-Party and his exchange M-SSP are not relevant to the inventive method.
- 35 This radio cell is linked to a particular characteristic in the service center. This may be a particular billing system referred to by the operator

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as the Home Zone, and this connection is thus billed
using a separate billing model.

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If the subscriber now moves, leaves the Home Zone and enters the neighboring radio cell FZ3, the central controller is informed about this change of position, as shown in the two subsequent figures.

5

The position is transmitted to the service center during the telephone call by means of additional *Unstructured Supplementary Service Data* USSD and SIM toolkit, for example. In this context, location

10 information available in MT and/or location changes are transmitted. Parameters which are available are, by way of example, "Location Area Identity" (LAI), "Serving Cell ID" and "Serving Cell Channel".

15 Two solution variants can be envisaged:

- SCP initiates: Figure 2. The IN service logic in the service control center SCP asks at service-specific time intervals whether the telephoning subscriber A-
20 Party has moved (- this allows the service provider to keep the signaling load under control). To this end, the SCP sends the IN customer a request USSD Request (to the Calling Party Address CgPA in the case of MOC services, to the Called Party Address CdPA in the case of MTC services) which tells the SIM
25 toolkit of the MS to respond with a USSD Response containing location information and/or location changes.
- MS initiates: Figure 3. In the event of handover, the
30 MT uses the SIM toolkit to inform the service center SCP via USSD Request that it has moved. Even within an enclosed space, handover frequently occurs if an adjacent cell has a better signal strength; in this
35 case, however, there has been no change of location relevant to the service provider. To prevent the SCP from being notified of an unnecessary amount of location changes as a result of this, a time

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controller can also be incorporated in the MT: the MS divulges the location information and/or location changes no earlier than after a settable

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time period, but immediately once this time period has elapsed.

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1. A method for monitoring the position of a mobile communication terminal for location dependent telecommunication services and an active voice connection, in which

- the service control center in the mobile radio network obtains a first information item relating to the position of the mobile terminal within the mobile radio network from the terminal when a connection is set up, and
- the first position information item is used by the selected location dependent telecommunication services, and
- the position of the terminal is checked again during the call, and
- the service control center uses a change of position established during the call which has been set up to obtain a second position information item from the terminal, and
- the second position information item is used by the telecommunication [lacuna].

2. The method as claimed in patent claim 1,
characterized in that
- a) the billing for the telecommunication service is dependent on the position information item for the terminal which is to be billed, and
 - b) if a change in the position of the terminal is established,
 - c) the billing for the telecommunication service is adjusted.

3. The method as claimed in patent claim 1,
35 characterized in that
a position information item for the terminal is
requested from the terminal by the service center.

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4. The method as claimed in one of the preceding
patent claims,
characterized in that
a position information item is requested or
reported at regular intervals.
- 5
5. The method as claimed in patent claim 1 or 2,
characterized in that
the position is reported after a change of
position.
- 10
6. The method as claimed in one of the preceding
patent claims,
characterized in that
the location information available in the terminal
is ascertained by SIM toolkit available [lacuna]
terminal.
- 15
7. The method as claimed in one of the preceding
patent claims,
characterized in that
a position information item is transmitted by
Unstructured Supplementary Service Data (USSD).
- 20
8. The method as claimed in one of the preceding
patent claims,
characterized in that
a position information item is transmitted by
Short Message Service (SMS).
- 25

Abstract

Method for monitoring the position of a mobile communication terminal for location dependent telecommunication services and an active voice connection

To guarantee that the telecommunication service works correctly during a call, the position of the terminal in question needs to be checked not only when the connection is set up but also for the entire time of the connection. If a change of position is established, the telecommunication service then needs to be changed in a corresponding manner by the service center.

Figure 1

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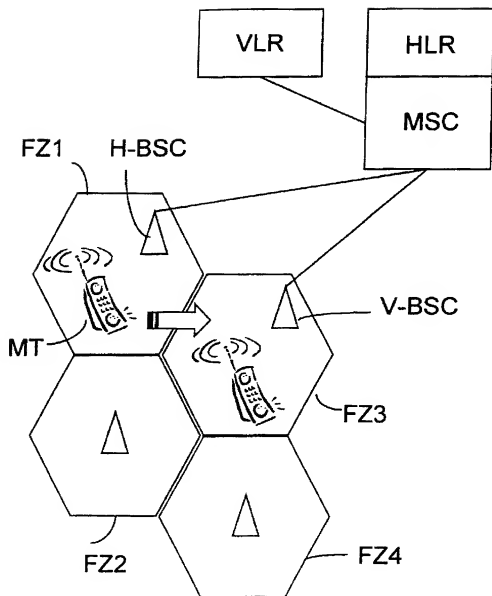


FIG 1

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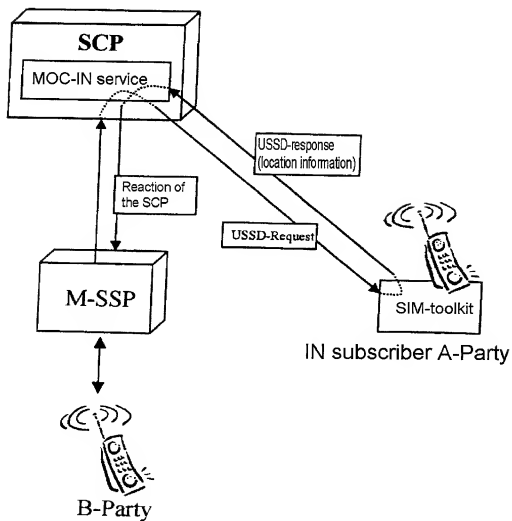


FIG 2

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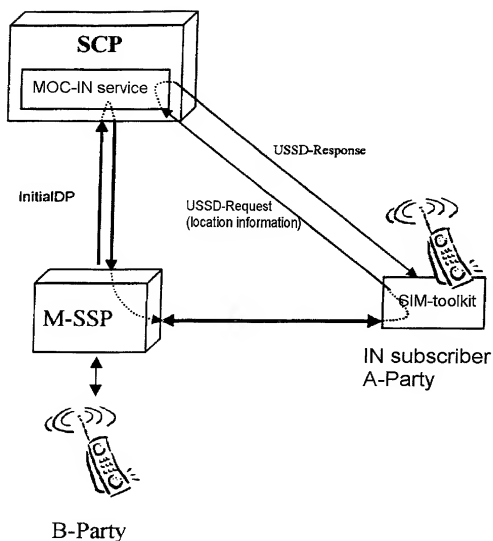


FIG 3

Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

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My residence, post office address and citizenship are as stated below next to my name,

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I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Verfahren zur Überwachung der Position
eines mobilen
Kommunikationsendgerätes bei
ortsabhängigen Telekommunikations-
Diensten und aktiver Sprachverbindung

Method for monitoring the position of a
mobile communication terminal in
location-dependent telecommunication
services and active voice link

deren Beschreibung

the specification of which

(zutreffendes ankreuzen)

☐ hier beigelegt ist.

☒ am 18.07.2000 als

PCT Internationale Anmeldung

PCT Anmeldungsnummer PCT/DE00/02331

eingereicht wurde und am

abgeändert wurde (falls tatsächlich abgeändert).

(check one)

☐ is attached hereto.

☒ was filed on 18.07.2000 as

PCT international application

PCT Application No. PCT/DE00/02331

and was amended on

(if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

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I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

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Prior foreign applications
Priorität beansprucht

Priority Claimed

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DE

12.08.1999

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☒ ☐
Yes No
Ja Nein

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☐ ☐
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Ja Nein

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☐ ☐
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Ja Nein

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PCT/DE00/02331
(Application Serial No.)
(Anmeldeseriennummer)

18.07.2001
(Filing Date D, M, Y)
(Anmeldedatum T, M, J)

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(Status)
(patentiert, anhängig,
aufgegeben)

pending
(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date D, M, Y)
(Anmeldedatum T, M, J)

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29177

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Staatsangehörigkeit DE		Citizenship DE	
Postanschrift SEEGEFELDER WEG 262a		Post Office Address SEEGEFELDER WEG 262a	
13591 BERLIN		13591 BERLIN	

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or
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Voller Name des einzigen oder ursprünglichen Erfinders: ALEXANDER ASCHIR		Full name of sole or first inventor: ALEXANDER ASCHIR	
Unterschrift des Erfinders	Datum	Inventor's signature	Date
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Staatsangehörigkeit DE		Citizenship DE	
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IN-560001 Bangalore INDIA		IN-560001 Bangalore INDIA	
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